Patent claims

1. A radiation-emitting thin-film semiconductor component with a multilayer structure (12) based on GaN, which contains an active, radiation-generating layer (14) and has a first main area (16) and a second main area (18) - remote from the first main area - for coupling out the radiation generated in the active, radiation-generating layer,
characterized in that
the first main area (16) of the multilayer structure (12) is coupled to a reflective layer or interface, and the region (22) of the multilayer structure that adjoins the second main area (18) of the multilayer structure is patterned one- or two-dimensionally.

2. The semiconductor component as claimed in claim 1, characterized in that
the region (22) of the multilayer structure that adjoins the second main area (18) of the multilayer structure (12) has convex elevations (26).

3. The semiconductor component as claimed in claim 2, characterized in that
the elevations (26) have the form of truncated pyramids or truncated cones or a trapezoidal cross-sectional form.

4. The semiconductor component as claimed in claim 2, characterized in that
the elevations (26) have the form of cones or a triangular cross-sectional form.

5. The semiconductor component as claimed in claim 2, characterized in that
the elevations (26) have the form of sphere segments or a circle segment cross-sectional form.

6. The semiconductor component as claimed in one of claims 2 to 5,
characterized in that
the elevations (26) have an aperture angle (α) of between approximately 30° and approximately 70°.

7. The semiconductor component as claimed in claim 6, characterized in that
the elevations (26) have an aperture angle (α) of between approximately 40° and approximately 50°.

8. The semiconductor component as claimed in one of claims 2 to 7,
characterized in that
the height (h1) of the elevations (26) is at least as large as the height (h2) of a plane region (20) of the multilayer structure (12) between the active, radiation-generating layer (14) and the elevations.

9. The semiconductor component as claimed in claim 8, characterized in that
the height (h1) of the elevations (26) is approximately twice as large as the height (h2) of the plane region (20) of the multilayer structure between the active, radiation-generating layer and the elevations.

10. The semiconductor component as claimed in one of claims 2 to 9,
characterized in that
a grid dimension (d) of the elevations (26) is at most approximately five times as large as the height (h1) of the elevations.

11. The semiconductor component as claimed in claim 10,
characterized in that
the grid dimension (d) of the elevations is at most approximately three times as large as the height (h1) of the elevations.

12. The semiconductor component as claimed in one of claims 1 to 11,
characterized in that
the layer (28) or interface coupled to the first main area (16) of the multilayer structure (12) has a degree of reflection of at least 70%.

13. The semiconductor component as claimed in one of claims 1 to 11,
characterized in that
the layer (28) or interface coupled to the first main area (16) of the multilayer structure (12) has a degree of reflection of at least 85%.

14. The semiconductor component as claimed in one of claims 1 to 13,
characterized in that
the multilayer structure (12) is applied by its first main area (16) directly or via a reflective layer (28) on a carrier substrate (30).

15. The semiconductor component as claimed in claim 14,
characterized in that
the reflective layer or the carrier substrate also serves as a contact area of the semiconductor component.

16. The semiconductor component as claimed in one of claims 1 to 15,
characterized in that
a conductive, transparent layer is applied on the second main area (18) of the multilayer structure (12).

17. The semiconductor component as claimed in one of claims 1 to 16,
characterized in that

a transparent protective layer (32) is applied on the second main area (18) of the multilayer structure (12).

18. A radiation-emitting thin-film semiconductor component with a multilayer structure (12) based on GaN, which contains an active, radiation-generating layer (14) and has a first main area (16) and a second main area (18) - remote from the first main area - for coupling out the radiation generated in the active, radiation-generating layer,
characterized in that
the first main area (16) of the multilayer structure (12) is coupled to a reflective layer (28) or interface, and a transparent layer (32) is provided between the first main area (16) of the multilayer structure and the reflective layer or interface, said transparent layer being patterned one- or two-dimensionally.

19. The semiconductor component as claimed in claim 18,
characterized in that
the transparent layer (34) is conductive.

20. The semiconductor component as claimed in claim 18 or 19,
characterized in that
the transparent layer (34) between the first main area (16) of the multilayer structure (12) and the reflective layer (28) or interface has convex elevations (26').

21. The semiconductor component as claimed in claim 20,
characterized in that
the elevations (26') have the form of truncated pyramids or truncated cones or a trapezoidal cross-sectional form.

22. The semiconductor component as claimed in claim 20 or 21,
characterized in that
the elevations (26') have an aperture angle (α) of between approximately 30° and approximately 70°.

23. The semiconductor component as claimed in claim 20 or 21,
characterized in that
the elevations (26') have an aperture angle (α) of between approximately 40° and approximately 50°.

24. The semiconductor component as claimed in one of claims 20 to 23,
characterized in that
the height (h1) of the elevations (26') is at least as large as the height (h2) of a plane region (35) of the multilayer structure (12) between the active, radiation-generating layer (14) and the elevations.

25. The semiconductor component as claimed in claim 24, characterized in that
the height (h1) of the elevations (26') is approximately twice as large as the height (h2) of the plane region (35) of the multilayer structure between the active, radiation-generating layer and the elevations.

26. The semiconductor component as claimed in one of claims 20 to 25,
characterized in that
a grid dimension (d) of the elevations (26') is at most approximately five times as large as the height (h1) of the elevations.

27. The semiconductor component as claimed in claim 26,
characterized in that

the grid dimension (d) of the elevations is at most approximately three times as large as the height (h1) of the elevations.

28. The semiconductor component as claimed in one of claims 18 to 27,
characterized in that
the layer or interface coupled to the first main area (16) of the multilayer structure (12) has a degree of reflection of at least 70%.

29. The semiconductor component as claimed in claim 28,
characterized in that
the layer or interface coupled to the first main area (16) of the multilayer structure (12) has a degree of reflection of at least 85%.

30. The semiconductor component as claimed in one of claims 18 to 29,
characterized in that
the reflective layer (28) is applied on a carrier substrate (30) or the reflective interface is formed by a carrier substrate (30).

31. The semiconductor component as claimed in claim 30,
characterized in that
the reflective layer or the carrier substrate also serves as a contact area of the semiconductor component.

32. The semiconductor component as claimed in one of claims 18 to 31,
characterized in that
a transparent protective layer is applied on the second main area (18) of the multilayer structure (12).